

Name: _____

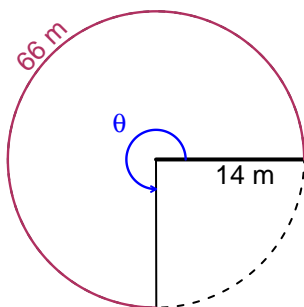
Date: _____

Trig Final (SLTN v648)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 66 meters. The radius is 14 meters. What is the angle measure in radians?

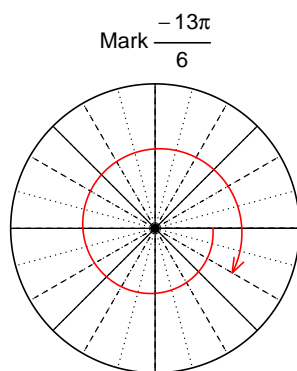


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 4.714$ radians.

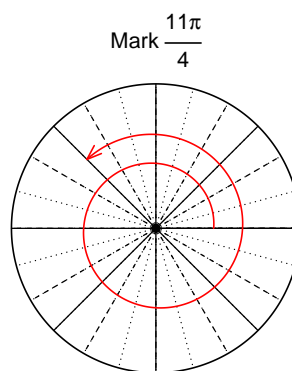
Question 2

Consider angles $-\frac{13\pi}{6}$ and $\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{13\pi}{6}\right)$ and $\sin\left(\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-13\pi/6)$

$$\cos(-13\pi/6) = \frac{\sqrt{3}}{2}$$



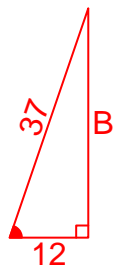
Find $\sin(11\pi/4)$

$$\sin(11\pi/4) = \frac{\sqrt{2}}{2}$$

Question 3

If $\cos(\theta) = \frac{-12}{37}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.

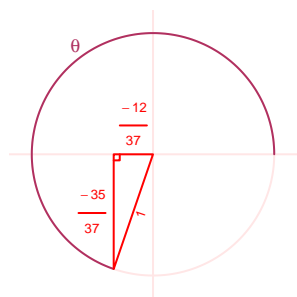
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}12^2 + B^2 &= 37^2 \\ B &= \sqrt{37^2 - 12^2} \\ B &= 35\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-35}{37}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -3.01$ meters, an amplitude of 7.68 meters, and a frequency of 5.3 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.68 \cos(2\pi 5.3t) - 3.01$$

or

$$y = -7.68 \cos(10.6\pi t) - 3.01$$

or

$$y = -7.68 \cos(33.3t) - 3.01$$